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SOIL CONSERVATION

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WELLINGTON BRINK, EDITOR

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Front Cover: Contour garden of Wilbur Runk, Cumberland County agricultural agent, Bridgeton, N. J., 1944. For timely discussion of contour gardening, see Mr. Pryor's short article, "Well-Rounded Gardens," elsewhere in this issue.

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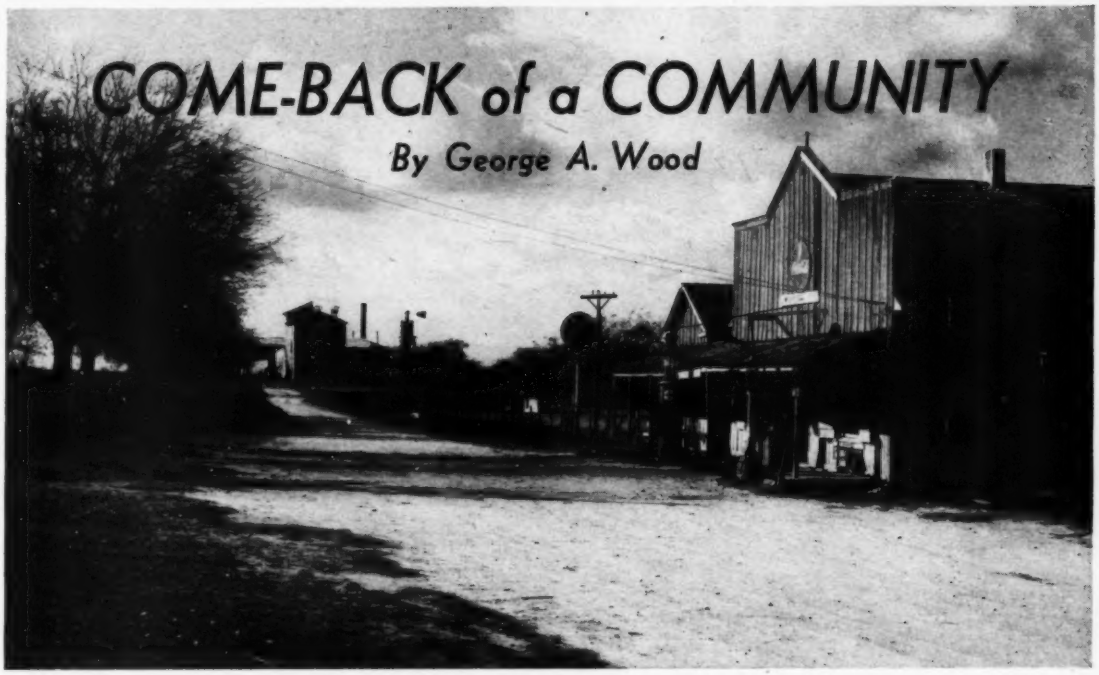
COME-BACK of a COMMUNITY

By George A. Wood



Nopal looks like this today. Thirty years ago more than a dozen buildings faced its main street.

NOPAL is a lonely-sounding Spanish name for a variety of cactus. It also is the name of a little agricultural community on the DeWitt-Gonzales county line in south central Texas that is winning a game fight to avoid the doubtful distinction of becoming a ghost town.

The community at one time was quite prosperous. Founded in 1890, it had a population of some 50 persons about 1910 and 1915. Nopal supported a gin, a general store, a school, a church, two dry-goods stores, a blacksmith shop, a drug store, a doctor's office, and a saloon and dance hall.

The fields surrounding Nopal were productive. More than 15,000 of the 25,000 acres right around the town were in cultivation. One year the gin handled 1,700 bales of cotton. That was more than a generation ago.

There was 1 year within the past decade when the gin handled only 36 bales. Last fall, 1945, however, the same gin took care of 333 bales.

The land isn't so productive as it was once. There aren't nearly so many acres in cultivation, either. Instead of 15,000 acres under the plow, there are less than 6,000. And these acres produce lower yields.

Needlegrass, an indicator of low fertility, has "taken" many fields. It has little grazing value. Other fields are covered with dense brush. Gullies furrow each hill. Sheet erosion has robbed many fields of the ability to produce well under cultivation.

As the fertility and productivity declined, the

Nopal's houses, many of them, are unoccupied and falling down. Occupants had to move away because the land became too unproductive to afford a living.

NOTE.—The author is district conservationist, Soil Conservation Service, with headquarters at Yorktown, Tex.

people left. They had to make a living and Nopal couldn't provide it. Only 12 persons voted in the last presidential election. But there was a time when that same box counted 120 votes.

The only buildings left in the formerly thriving business center are the gin, the blacksmith shop, a general store that serves also as trading center and postoffice, and the church, which is used only on rare occasions. The nearest school is 2 miles away.

What caused the decline? Plowing up and down the slope, for one thing.

Cultivating land that should never have been taken out of native grass is another cause of Nopal's trouble. Some of the land on the hillsides is too steep to cultivate safely—erosion can't be controlled there. But centuries of grass had built up enough fertility on the hillsides for them to produce well for a few years before erosion removed their vigor.

Failing to restore the organic matter and fertility to the soils is a third reason Nopal can't support so many people as formerly. Soils need building up, constant replenishment. When all the fertility is taken out by crop after crop and by progressive erosion, the productivity is gone. Legume and grass crops which put nitrogen and organic matter in the soil were needed in Nopal, but no one realized that need until almost 19,000 acres had washed severely.

There are many reasons for Nopal's decline, some of them economic and some social. All relate directly to erosion on the farms and their resulting inability to produce profitably.

Now, recognizing that erosion has to be controlled and soil productivity built up before they can make a reasonable living, Nopal farmers are hard at work to make their community a good place in which to live. They got their start in using conservation farming methods from Joe Wischkaemper, one of the supervisors of the Middle Guadalupe Basin Soil Conservation District. Wischkaemper, during frequent visits with friends in the Nopal vicinity, kept stressing the values of conservation operations.

Many of Nopal's fields look like this. Each 100 acres in the area has at least one gully six feet or more deep. Erosion has robbed the community of much of its ability to produce.

Finally Carl Hattenback became interested enough to do something. Hattenback talked with his neighbors. Then he talked with the supervisors of the soil conservation district. The upshot was formation of the Nopal Conservation Group within the district. Hattenbach was named leader.

Working through the group, the district sent technicians of the Soil Conservation Service. The farms of the Nopal district cooperators were planned as a unit. Farmers and technicians knew that erosion pays little attention to property lines. Conservation group action has been growing ever since. Last fall a number of the members at Nopal worked together during harvest. Some of the cooperators have purchased farm equipment together.

Planning the Nopal Conservation Group farms as a unit has involved making a coordinated soil and moisture conservation plan by each farmer. The owners and land operators have had the help of Soil Conservation Service technicians. The conservation measures on each farm vary as the needs vary.

Willie Metting, for example, has planted Rhodes grass meadow strips in natural drainageways on his place. After seeding early last spring, Metting's grass did well and by fall was providing adequate covering to keep the drainageway from eroding when terrace run-off water coursed through.

Another cooperator in the vicinity, C. J. Mueller, is putting his entire farm in pasture. He uses Rhodes grass as one of his principal pasture plants. Mueller has found that the grass helps control erosion and at the same time provides good grazing. He was able to cut 10 tons of hay off the Rhodes grass last summer, only a few months after he planted it. There was some Johnson grass with the Rhodes grass.

Ewald Metting uses a conservation crop rotation each year, alternating legume crops in the winter with cash crops in the summer. He has

(Continued on page 222)

Rhodes grass is an important part of the coordinated program. Herefords grow fat on good pasture grasses of the sort shown here.

Bluestem is one of the good pasture grasses being used on eroded lands to help Nopal fight its way back to prosperity.

(*Continued from page 220*)

found that Austrian winter peas, when inoculated and fertilized with superphosphate, are his best winter cover crops. Ewald Metting uses these crops to control wind erosion on his peanut fields during winter and to improve soil structure and productivity. Another conservation practice he uses is to plow his corn and cotton stalks into the top few inches of soil immediately after harvest. The crop residue helps prevent wind and water erosion, conserves moisture by decreasing the rate of evaporation, and helps improve the soil.

Among many other conservation measures they use, Ewald and Willie Metting have installed terrace systems and cultivate on the contour where needed.

W. O. Baker is another conservation farmer at Nopal. Regularly he grows clover to keep his soil fertile and productive. Another measure he follows is the planting of winter pasture for his cattle. Baker has found Italian ryegrass excellent for that purpose, since it gives good grazing all winter and through early spring. The ryegrass does well at a time when little native forage is available.

A number of the Nopal cooperators use diversion terraces, as well as sod, to help heal gullies.

Conservation Group Leader Hattenbach has done considerable grassland development as part of his conservation program. He has installed a combination tame grass-native grass pasture that is paying off in profitable grazing. Hattenbach planted 10 acres of a 210-acre enclosure to Rhodes grass. On the rest of the area he has left native bluestem. To help the quality of the nourishment the pasture gives his cattle and to aid the plants in making good growth, he has applied superphosphate. Another pasture development practice he follows is mowing weeds to keep them from using up the moisture and plant nutrients which the better plants need. He always tries to mow just after the weeds flower, but before they seed.

Hattenbach adjusts the number of livestock according to the ability of the grassland to provide grazing. He rotates his cattle through permanent and temporary pasture so that they will have green forage as long as possible each season.

Willie and Ewald Metting, Baker, and Hattenbach are only a few of the conservation farmers in the Nopal vicinity who are operating their farms in a way calculated to control erosion while building up productivity.

They, and the other farmers there, have a long way to go before any sizable number of Nopal's acres are producing at their maximum. They've made a start. Nopal is now on the way back to agricultural prosperity.

WELL-ROUNDED GARDENS (*See front cover*)

THE curving rows of vigorous vegetables in the cover photograph of this issue are both symbolic and practical.

They are symbolic of the new tillage techniques which are advancing American agriculture.

They are practical because they protect the soil from erosion, arch enemy of farmers and gardeners all over the world. They are practical because together with other conservation practices they are increasing the yields on thousands of home gardens as well as on millions of acres of farmlands.

Home gardening—producing not only flowers but fresh, health-giving foods in spare time—gained countless new devotees during the war years. These people, who before had bought worn and weary vegetables and fruits in the markets, have found these important items of diet not only better to look at and better to eat when grown at home, but likewise exciting to produce.

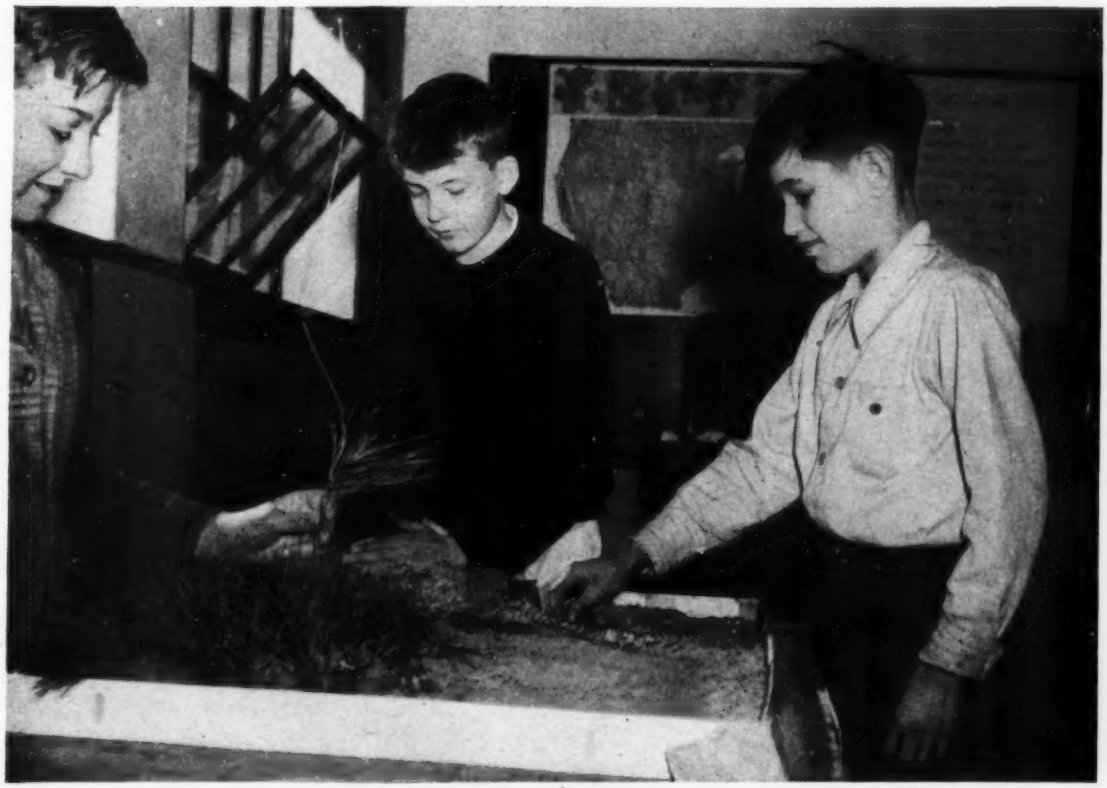
Many of them have found likewise that adaptation of the modern methods the good farmer uses on his expansive acres have resulted in more and better vegetables and fruits. They have had more to eat fresh from the garden; more to can, preserve, pickle or freeze for winter use. And they have found also that these new methods give gardening a new interest, reduce the drudgery, and make it fun. Actually fun!

The fact is, most of the soil and water conservation farming methods that good farmers are using throughout the country can be adapted to the home garden, whether you're talking about contoured rows, mulching, diversions, or even simplified bench terraces. And all lead to better garden results than you've known before. These curving rows of vegetables are the visual symbols of a new and fruitful day for home gardeners.

William C. Pryor.

South Carolina's Program for Schools

By J. B. Douthit and Forrest Steele



Seventh graders in Mrs. R. L. Ballentine's room at Anderson, S. C., Junior High School establish some soil conservation practices in a sandbox. Left to right: Maurice Hubert Nimnons plants pine trees, Bobby Todd shapes a terrace, and Frank Lewis builds a meadow drainageway.

An old preacher once said to his congregation, "I don't care about you old folks, you're too sot in your ways ever to change. It's the boys and girls I'm trying to save."

SOIL conservation district supervisors in South Carolina know that if you teach a child to love and appreciate the soil and the earth's resources he will become a real conservationist, and in the meantime he will have a profound influence on his elders.

In 1943 it was agreed that more soil and water conservation information should be made available to teachers and pupils of the South Carolina public schools. The school curriculum was undergoing changes that were in keeping with the changing attitudes toward education. Under the leadership of State Superintendent J. H. Hope, many improvements were made: teachers' salaries were raised; a teacher recertification program was instituted; an additional year was added, making possible a 12-year public school program; necessary revisions in the curriculum were begun. One

NOTE.—The authors are president of the South Carolina Association of Soil Conservation District Supervisors, and chairman of the board of district supervisors, Upper Savannah Soil Conservation District, Pendleton, S. C., and survey supervisor, Soil Conservation Service, Columbia, S. C., respectively.

of the most significant changes was the increasing emphasis on the child's environment and its influences.

The time was ripe for action. The need was there. The information was known, and available. Only the right start was needed, and the district supervisors were able to supply that. They went to the officials of the State Bankers' Association.

You don't have to be a follower of Henry George to understand that most of South Carolina's wealth comes originally from the land. Bankers of the State, as keen as bankers everywhere, were quick to recognize achievement in agriculture and to sponsor worthwhile agricultural movements. Increased attention to soil conservation very naturally drew their full support. As one man expressed it, "Who knows better than a banker that you must protect your capital—in the farmer's case, his soil resources."

When an essay contest on soil conservation for public school students was suggested by an upper Savannah district supervisor, the bankers' association heartily agreed to sponsor it in cooperation with the State Association of Soil Conservation District Supervisors. Aid was easily obtained from the vocatonal agriculture teachers, 4–H Club workers, Soil Conservation Service men, and interested school people. To give the idea State-wide circulation, to furnish information to a host of school children and their teachers who had almost no pertinent material, was a huge task.

Spearheading the move to get more soil conservation information to the school children of South Carolina were E. C. McArthur, a supervisor of the Broad River Soil Conservation District and at that time president of the South Carolina Association of Soil Conservation District Supervisors; E. R. Alexander, secretary of the South Carolina Bankers' Association, and State Superintendent of Education Hope.

The contest ended in the spring of 1944 with a deluge of essays—more than 5,000. They were excellent, good, bad, and worse, but everyone showed genuine interest, and a willingness on the part of the pupils and their teachers to grapple with the basic problem of the soil. Essays came from every county in the state. They discussed everything from saving orange peel to proper use of waste land on the coast. Most of them, however, revealed a definite need for more accurate information on the soil-conservation problems of the State. Lack of knowledge of coastal plains problems was particularly apparent.

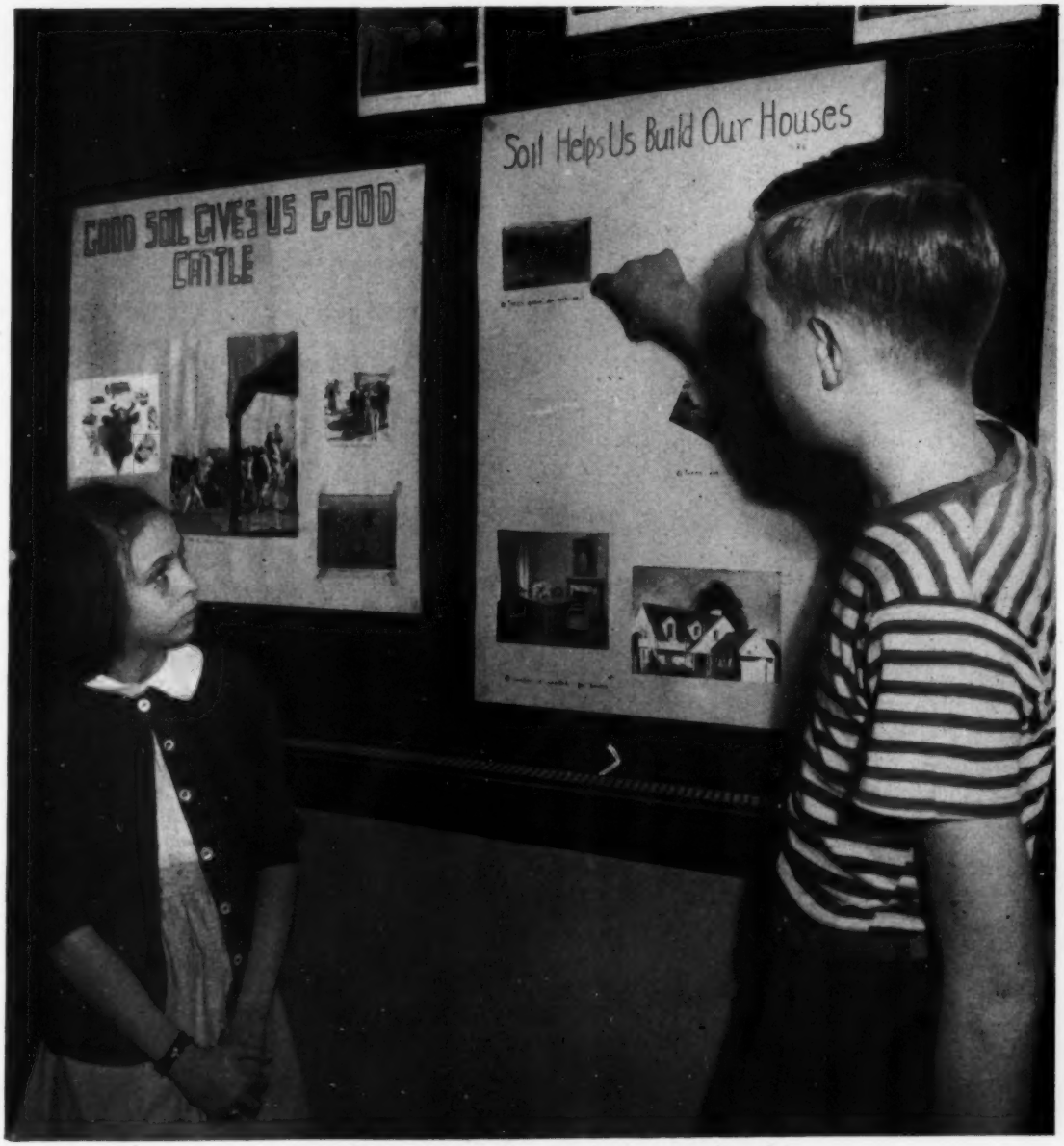
With this need for information in mind, the district supervisors invited a group of people interested in soil conservation work in the State, and education leaders, to meet at Clemson College in June 1944, to plan for action. Attending were representatives of State department of education, State department of vocational agriculture, Clemson Agricultural College, experiment station, Extension Service, South Carolina Association of District Supervisors, South Carolina Bankers' Association, and Soil Conservation Service, as well as superintendents of several schools. Recognizing the need for appropriate teaching material for the children in the upper middle grades, this committee took steps to make it available.

A committee of three teachers was selected to work as collaborators of the Soil Conservation Service under the direction of T. W. Webb, assistant State conservationist, and Miss Lena Moore of the State department of education. These teachers were Misses Claudia Pounds, of Ninety Six; Evelyn Jones of Ware Shoals; and Golden Brooks, of Taylor School, Columbia. They prepared an instructional unit on soil conservation to be incorporated in the course of study. As the work seemed to fit most naturally into the subjects taught in the sixth grade, the material was prepared with the sixth grade level in mind, but it was not restricted to the sixth grade. The judgment of Verd Peterson, State supervisor of agricultural education, was invaluable in fitting the study of soil conservation into the curriculum.

In addition to the instructional unit for teachers, a story for the children, entitled, "Over the Hills to the Sea," was written by the committee, and published in attractive form by the State Bankers' Association. Both the instructional unit and the story were approved for use by the State Board of Education.

It was realized that a most important step in getting soil conservation taught in schools is to interest the teachers and school superintendents in the subject. Several steps were taken to accomplish this.

Miss Jones and Miss Pounds discussed their views of soil conservation at the State meeting of district supervisors in August. A story, A Teacher's View of Soil Conservation, was written by Miss Evelyn Jones and appeared in the November 1944 issue of the *South Carolina Education Bulle-*



Nancy Welch and Marion Woodward, seventh-grade pupils of Mrs. Frances Kitching, Anderson Junior High School, discuss soil conservation posters they have made.

tin which is published by the South Carolina Education Association and is sent to all school teachers and many laymen in the State.

Another story on the material for use in the schools appeared in the December 1944 issue of the same magazine. These stories were designed to stimulate interest in soil conservation on the part of the teachers throughout the State. Still another article on the subject was in the December 1944 issue of *South Carolina Education News.*

Teachers and school officials in selected schools throughout the State were called together to discuss the material and its possible use. These meetings were conducted by representatives of the State

It may take a thousand years for heat, cold, water, animals and vegetation to build an inch of topsoil from rocks such as Mrs. Kitching's students have collected. Teacher discusses this with Betty Shirley and Bobbie Gleason.

Department of Education, State Bankers' Association, Soil Conservation District Supervisors Association, and Soil Conservation Service.

No attempt was made to distribute information to all the schools for the season of 1944–45. Instead, 26 widely distributed schools were chosen for a concentrated effort to gain the necessary interest and to make the course successful in those schools.

Now that another spring season is at hand, the number of schools planning to teach soil conservation is greatly increased. We do not know just how many will carry the work this year. However, in the Upper Savannah Soil Conservation District, which includes Pickens, Oconee, and Anderson Counties, the number will rise from 5 last year to 26 this year—or as many as there were in the entire State in 1945. Teachers, superintendents, and pupils are responding with enthusiasm.

T. E. Mabry, superintendent of schools in Westminster, says: "People do not realize how much influence pupils have on their parents. The study of soil conservation in our school has aroused more than the interest of the pupils; the parents, likewise, have become interested."

Although many pupils live in town, their parents own farms and are vitally interested in farm lands. Recognizing this fact, T. H. Ulmer, principal of one of the Anderson city schools, said, "More material for soil and water conservation should be put in school libraries and made available to boys and girls."

The superintendent of Williamston schools, A. B. Hair, Jr., commented: "In my school where pupils used the booklet, 'Over the Hills to the Sea,' more than 200 adults also read the booklet. Most of these were people who live on the farm."

Georgia L. Hamlet, an Anderson County teacher, gave this report on the unit she taught: "The material on soil conservation was very helpful to my class. We used it for reports and as a source for securing general information on soil, soil erosion, and the conservation of soil in our States. The pupils' interest was keen because they were able to apply their science to real life. From the study of the soil conditions around them they could understand their textbook better. I wish we could have had more pictures on soil erosion and ways of controlling it. Samples of the different types of South Carolina soil would have helped; also, films on soil conservation could have been used to advantage."

One teacher reported: "Some farmers have placed their farms under soil conservation plans in cooperation with the district because of the interest of their children in what they learned at school. The irregular attendance of some children from farm homes ceased to be a problem of the school. The interest in the study of conservation led to regular attendance and a better attitude toward all school work."

From the pupils themselves came many comments: "The pictures were good. They told a good story about conservation in our State," said Elizabeth Manning.

"The book would be better if it had more pictures of people in it," remarked Joyce Fields.

"Our State is wasteful with her land. This book shows this very clearly," pointed out Clarence Mize.

The soil-conservation district supervisors look to the day when South Carolina's land resources will be in the hands of a generation of men and women who learned while they were children to love and appreciate the State's soil. When this takes place, we shall be winning the battle to save the land.

QUERY THE EDITOR

New ideas, new contributors, are welcomed by *Soil Conservation* Magazine. It is suggested that writers first inquire by letter as to the suitability of a proposed article, including a brief synopsis.

Pensacola Bahia grass sprig-planted in rows at Thorsby, Ala., nursery.

This is how the grass looked one year later. The soil was sandy.

The Narrow-Leaf Bahia Grasses

By R. Y. Bailey

Harvesting seed of Pensacola Bahia grass with a combine at the Soil Conservation Service Nursery, Americus, Ga.

GRASSES that produce good ground cover on upland soils and that make large yields of seed that can be harvested easily have long been needed in the Southeast. In planning the use of land on farms, it is highly desirable to provide for a combination of grass pastures and perennial legumes for pasture, so that each farm will have a well-balanced grazing program. The lack of grasses that could easily be established on upland by direct seeding has handicapped farm planners in the cotton belt.

Into the picture recently have come two new grasses that appear to be a considerable part of the answer to our requirements. These are the Pensacola and the Wilmington narrow-leaf strains of Bahia grass (Paspalum notatum).

Paul Tabor, who is in charge of the observational nurseries of the Soil Conservation Service in the southeastern region, found a grass growing on lawns and along the sides of railroad tracks at Pensacola, Fla. This grass looked promising to Tabor and he collected a small amount of seed for trial in the observational nurseries. Later he

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Spartanburg, S. C.

went back to Pensacola and got a small quantity of sod which also was planted in the nurseries.

County Agent E. H. Finlayson, of Escambia County, Fla., also found this grass and was attracted by its growth and seeding habits on the sandy soils around Pensacola. In a recent letter Finlayson said, "I first noticed this grass when I started work here in November 1935, but did not think so much of its possibilities until early 1938 when a sand bank between my residence and office was sodded to it. I harvested a few seed that summer for George E. Ritchey of the Florida Experiment Station to try. These seed were improperly harvested and showed very little germination.

"In 1939, after a more careful study of the seeding habits of the plant, I harvested 14 pounds more of the seed which were sent to Mr. Ritchey and scattered around among dairymen and farmers in the County, a pound of seed going to each of two farmers in Jefferson County.

"In 1941 I succeeded in harvesting about a thousand pounds of seed off the streets. Local dairymen and others, whom I had interested in the grass, harvested possibly 500 pounds of seed that year.

"I harvested 2,400 pounds of seed in 1945 from a 32-acre planting that I have on a farm which I own in Jefferson County. Twelve acres of the planting were seeded in 1942 and the balance in the late summer of 1943."

It is of interest that Finlayson and Tabor, working independently of each other, were impressed with the possibilities of the grass. Each of the two, without knowledge of what the other was doing, proceeded with plans to get the grass into production.

Tabor's collections have grown into rather extensive Soil Conservation Service nursery plantings of approximately 265 acres. Seed was harvested from approximately 50 acres in 1945 and the entire acreage will be available for harvesting next year. The 16,000 pounds of seed harvested in 1945 was granted to soil conservation districts for the establishment of 5-acre seed production areas from which additional seed will be harvested and sold locally to farmers who want the grass. At a seeding rate of 20 pounds per acre, this will give an increase of approximately 800 acres for seed production on farms.

Pensacola Bahia was planted at Service nurseries at Chapel Hill, N. C., and Sandy Level, Va., for further observation. It grew well at both places but the stand was severely thinned by cold. Chapel Hill and Sandy Level were simply too far north for this kind of Bahia grass.

In the meantime, Tabor still was looking for useful plants. In his search he found another narrow-leaf Bahia grass at Wilmington, N. C., that looked much like Pensacola Bahia. When planted at the nurseries, however, this new kind that Tabor calls Wilmington Bahia was not injured by the winter temperatures that so severely thinned the stands of Pensacola Bahia. So, out of his patient search for better grasses, Tabor has found two that may prove useful; one in the lower and the other in the middle South.

Wilmington Bahia differs slightly from Pensacola Bahia in that the seed heads tend to droop slightly as they approach maturity, whereas Pensacola stands upright until the seed is fully mature. Otherwise, the two are outwardly the same.

Although the two grasses are outwardly similar, they vary definitely in cold resistance. After it was learned that Pensacola suffered severe cold damage at Chapel Hill where Wilmington was not affected by winter temperatures, it was decided that a line must be drawn as a guide in the future distribution of the two grasses.

Since Pensacola Bahia has made such a promising start in the lower part of the region, we wanted to use it wherever climatic conditions would permit. Pensacola Bahia suffered no winter damage at the Thorsby, Ala., nursery. This indicated that the dividing line between the two grasses could be drawn north of Thorsby. In establishing the line, soil conservation district boundaries were followed, in a general way, for convenience. As a result, the line varies considerably from north to south. In all cases, however, we tried to keep the line far enough south to be sure that Pensacola Bahia was not taken too far north.

Reading from west to east on the regional map, the line follows the northern boundaries of Warren, Madison, Leake, Neshoba, and Kemper Counties in Mississippi; Sumter, Greene, Hale, Bibb, Chilton, Coosa, Tallapoosa, and Chambers Counties in Alabama; Troup, Meriwether, Talbot, Taylor, Crawford, Bibb, Twiggs, Wilkinson, Washington, Johnson, Emanuel, Bulloch, and Screven Counties, in Georgia; and Hampton, Colleton, Dorchester, Berkeley, Williamsburg, and Georgetown Counties in South Carolina.

If the weather and other conditions are favorable for seed production in 1946, sufficient seed of Pensacola Bahia should be harvested to establish one or more 5-acre observational and seed-production areas in each county in all soil conservation districts south of the Wilmington-Pensacola line.

Production of Wilmington Bahia seed is not so far advanced as is that of the Pensacola Bahia. Only enough seed was harvested in 1945 to establish one 5-acre observational and seed-production area in each of 12 counties north of the line. Production of Wilmington Bahia seed is being expanded as rapidly as possible and it is hoped that in 1946 enough seed will be harvested to establish observational and seed-production areas in an additional 40 to 50 counties north of the line.

It is not the policy of the Soil Conservation Service to produce any seed for general distribution to farmers. Seed will be distributed to soil-conservation districts for further observational plantings on farms. Sufficient seed will be furnished to plant 5 acres on a farm. Personnel of the Soil Conservation Service nurseries will follow up these plantings to further observe the behavior of the grasses under farm conditions. These observational plantings will be located on farms where harvesting equipment is available so that if the grasses are sufficiently impressive under farm conditions seed may be harvested. Seed harvested on each farm will belong to the farmer who may use it to further expand the acreage on his own farm, or may sell seed to other farmers who want to establish the grass on their farms. Of course, if the grasses do not make a favorable showing in these observational plantings, farmers will not wish to harvest seed.

It will be our policy to furnish seed of these grasses to state agricultural experiment stations for any plantings they may wish to make.

By following the policy outlined, the Soil Conservation Service will continue the production and harvesting of seed only until a sufficient number

Paul Tabor examines seed heads of Wilmington Bahia grass at the Soil Conservation Service Nursery, Rock Hill, S. C. Note the drooping seed heads.

of seed blocks are established to insure the general distribution of seed to farmers who may want it.

Although northern limits have been set for the distribution of Pensacola Bahia no such limits have been fixed for Wilmington. This grass promises to be useful in upland pastures at least a little farther north than Dallis grass will survive the winters. If this proves true, its ability to grow well on upland and its extra winter hardiness may make Wilmington Bahia an important addition to the list of pasture grasses in the middle South. Much additional information must be gathered through field experience before the full possibilities of this grass will be known.

The narrow-leaf Bahia grasses have shown, in Soil Conservation Service nurseries, that they will survive and make a certain amount of growth on upland soils that are too dry for most other pasture grasses. No claim is made, however, that these grasses perform any miracles of growth on poor soils. Like all other grasses, they respond well to nitrogen and make vigorous growth or produce even moderately large yields of seed only when well supplied with nitrogen. Seed yields on poor sandy soils at Soil Conservation Service nurseries have been influenced very markedly by applications of nitrogenous fertilizers. At the Americus, Ga., nursery a liberal application of nitrogen early in the spring resulted in vigorous spring growth and good yields of seed at the first harvest, in late June and July. Yields at the second harvest were lower than the first and the third harvest was too light to be profitable. Appearance of the plants indicated that the applied nitrogen was used up early in the season and that nitrogen starvation limited yields of seed later in the season. Nitrogen starvation as a factor in seed production was further indicated by grass on small spots in the field where the fertilizer distributor missed. Grass on these unfertilized spots was characteristically pale in color and produced little seed.

Based on experience at the Americus Nursery in 1945, it appears that a second application of nitrogen immediately following the first seed harvest would stimulate seed production so that three crops of seed would be produced in a season instead of the two crops that were harvested.

Moisture also is an important factor in seed production. This was clearly shown at the Rock Hill, S. C., Nursery where a prolonged drought in the spring of 1945 caused a complete failure of the first seed crop of Wilmington Bahia. Seed heads were formed, but the seed failed to develop. Summer rain resulted in fair seed production later in the season.

Experience gained in a small pasture at the Thorsby, Ala., nursery and in an acre planting in a pasture on the farm of W. A. Womack, Ashford, Ala., shows that Pensacola Bahia grass is eaten readily by livestock. Palatability of the Wilmington Bahia has not been observed, but general characteristics of the two grases are so similar that it seems probable that this grass should be about as palatable as Pensacola Bahia.

We do not know how well these grasses will grow in mixture with legumes, but believe they will not differ greatly from Dallis grass in this respect. The kind of legumes will probably be different from those usually seeded on lowlands in mixtures with Dallis grass. Annual lespedeza or creeping beggarweed offer possibilities on upland clay and light sandy soils, respectively. Crimson and hop clovers also offer possibilities on upland soils where they are adapted. If no legumes prove adapted in mixtures with these grasses, application of nitrogen will be required for anything approaching maximum production of either forage or seed.

Progress with Pensacola Bahia has been sufficient to warrant the statement that both County Agent Finlayson and Plant Explorer Tabor have made an important contribution to the pasture possibilities of the lower South. Performance of Wilmington Bahia farther north can at least be described as promising. If this grass lives up to its early prospects, Tabor also will have made a very definite contribution to the pasture program in the middle South.

There is a possibility that these narrow-leaf kinds of Bahia grass may find a place as cropland grasses to be sown in a mixture with annual lespedeza that is to remain on the land two or more years. If this proves true, it will increase greatly the value of these grasses in sections where no suitable grasses for use in crop rotations are available.

This article is intended as a progress report rather than as an announcement that we have found new grasses that meet all requirements in upland pasture. We have learned to date that they will grow on uplands that are too dry for most other pasture grasses grown in the South. They produce good yields of seed that germinates fairly readily. Much remains to be learned about their carrying capacity and nutritive values.

WATER *for the Land of "Old Jules"*

By Joseph P. Collopy

ON THE MIRAGE FLATS project near Hay Springs, Nebr., streamlined land development is going on in a big way. In this dryland-farmed area, made famous by the historic novel "Old Jules," the Soil Conservation Service has an assembly-line style of farm irrigation development.

Upon completion of the project, this valley will be one of the most productive areas in the state. Irrigation is being brought to this fertile and gently sloping stock-raising area in a short span of 18 months. To do this required planning plus manpower. The planning has been done, and construction and other work is under way.

Mirage Flats represents a somewhat new type of irrigation development. Heretofore, emphasis has been placed on the larger areas. On Mirage Flats, the Bureau of Reclamation and the Soil Conservation Service are partners in developing a comparatively small area for irrigation. Yet the small acreage should not minimize its importance.

The Soil Conservation Service came into the picture when administration of the Case-Wheeler program was transferred to the Soil Conservation Service in July 1945. The Mirage Flats project was already under way. The Soil Conservation Service will cooperate with new settlers in providing technical assistance to guide them in matters of good farm practices, soil and water conservation, crop rotations, building soil fertility, and other phases of efficient land use. First undertaken, was the making of topographical and soils survey maps. The topographical map afforded complete data on slope land, surface drainage, and related facts. The soils survey map provided information on such things as types of soils and extent of erosion. From these maps the general plan was developed, including the lay-out and size of farm laterals, the necessary systems for surface and deep drains, and roadways. Each farm is regarded as a unit, and the project is being developed on that basis.

When the Mirage Flats project was approved under the Case-Wheeler Act, many of the landowners chose to sell their land to the government for development. Of the 12,000 acres which will be irrigated, 500 remain in private ownership. There will be some 120 irrigated farms. The settling of farmers on the land will be the responsibility of the Soil Conservation Service. With this percentage of the land development under federal control, engineers and farm management technicians had an opportunity to lay out economic size units according to topographic and soils conditions. The boundaries of the farms are determined by the main laterals, drains, watersheds, etc. In this way the farms are not divided by drainage ditches, nor cut up by large laterals. No small areas are cut off by laterals supplying adjoining farms, and no portions are bordering adjacent units to be left dry and infested with weeds because they must be irrigated with ditches through the neighbor's field. This is a contrast to the practice of using legal subdivision lines of the general land office surveys.

The arrangement of farms and roads will have quite a different appearance when this type of subdivision is finished. The farm boundaries will follow the layout of the irrigation and drainage pattern. They will be a contrast to the usual layout of farms in the general land office survey plan pattern.

One of the first operations was leveling. This was necessary because the natural land surface was slightly undulating. In that condition, the land would have been uneconomical to irrigate. In making plans to do this leveling job, the topographical map was used to determine where to place fills and make cuts. The soils survey map indicated the depth of soil profile and underlying materials so that the leveling process could for the most part avoid heavy cuts where there might be small areas of shallow to moderately deep soils. Then the field laterals were charted and the unit divided into fields. After the farm-supply laterals were located and the surface drains made, such structures as drops, checks, and turn-outs were put in place.

In October 1944, the contract was let for leveling and for the construction of farm laterals

NOTE.—The author is project engineer, Mirage Flats Case-Wheeler project, Soil Conservation Service, Hay Springs, Nebr.

and irrigation structures. Most of the land has been leveled, and the farm ditches and concrete irrigation structures will all be in place and ready for irrigation water this year.

About 8 miles north of Hemingford, the Bureau of Reclamation is completing an earth-filled dam across the Niobrara River. The dam will impound 35,000 acre-feet of water. The stored water is carried in the existing river channel to a point 7 or 8 miles below the dam where it is diverted into the irrigation system. The main canal has a 16-foot bottom and a capacity of 220 second feet, and extends 11 miles toward the project, before the main laterals begin. The siphons, checks, turnouts, and bridges built in connection with the main canal and laterals are of reinforced concrete and of the latest design.

On the Mirage Flats project all this planning and engineering is now bearing fruit. The large storage dam is 90 percent complete. The diversion dam is already finished. The main canal is nearly ready. Heavy draglines and large scrapers powered by diesel engines are bringing the construction of the main laterals to completion. Nine thousand acres of land which a few months ago stood as ordinary undulating dry farmland, is now carefully planned and leveled for easy and economic watering. Soon all this work will be paying off in increased production and stabilized resources.

Should This Land Be in Timber?

Well-stocked, even-aged stands of Douglas-fir can be appraised for site quality by measuring average ages and heights of dominant and co-dominant trees. A soils profile determination, correlated with timber site quality, will provide site quality values quickly and accurately.

By Albert Arnst and William W. Hill

A NEW use for utilitarian conservation surveys as a basis for establishing land use capability classes is developing in the Douglas-fir region of the Pacific Northwest.

There is no correlation between timber-site classes and the Service's land capability classes. For example, timber site I rating could be given to a soil that occurs in two or more of our land-capability classes. A study to determine if there is any correlation between utilitarian soil grouping and timber site classes was initiated in May 1944 in the Lewis County (Wash.) Soil Conservation District. The timber-site-class information gives us an added factor for use in setting up land capability classes. Now, timber site class is taken into consideration as well as susceptibility to erosion, physical limitations in use, and management requirements.

NOTE.—The authors are forestry specialist, Sedro Woolley, Wash., and soil conservation surveys supervisor, Portland, Oreg., respectively, both with the Soil Conservation Service.

Immature stands sometimes are difficult to measure accurately for site quality. On some soils the trees may attain height exceptionally fast in the earlier years but be slowed down because of "root cramping" later on. A soils profile determination helps to indicate the real site quality.

With the utilitarian survey, correlated with timber site classes, Service technicians now can give landowners a close estimate of the productive capacity of a particular tract for timber. Also, using the survey, they can give a farmer an idea of whether that tract would produce more in timber than it would in pasture or other farm uses.

The new yardstick of timber-production removes much of the guesswork in deciding on the timber productive capacity of land. The new system works in logged-over areas, where other methods leave estimates of the probable timber yield to speculation. In forest regions this determination is needed by conservationists assisting farmers and timber owners in planning best land use.

The utilitarian soil-conservation survey, basic in prescribing land-use adjustments, now is doubly useful. Correlated with timber-site classes, it indicates the timber productivity as well as use limitation of lands. To date, the only reliable measurements of timber productivity have been the timber-site classes developed and used by foresters.

The timber-site classes represent a measure of potential timber productive capacity of land. This rating of tree growth is an aid in determining whether or not the land would return a profit from timber. For example, where Douglas-fir grows fastest (190 feet or more in height in 100 years), it is placed in site class I. Where it can barely keep alive, the site class assigned to the stand is class V.

Foresters ordinarily determine site class by measuring the average height and average age of the tallest 10 percent of the trees in a uniformly stocked stand. This takes time, and special instru-

Should the farmer clear this land for agriculture or try to reestablish Douglas-fir? There are no living trees to measure for rate of timber production, but the conservation surveyor can now give the facts on which the farmer can base his decision.

ments. By this method timber-site classes cannot be set up for lands where trees are not present. We therefore sought a reliable yardstick which would accurately forecast timber yields per acre of land, in the absence of trees. Such a guide had to be easily understood and applied because workers without forestry training would be its principal users.

We knew that the degree and direction of slope, the altitude, the rainfall and the kinds of soils affect the rate of timber growth. But we also were aware of the difficulty of measuring the effect of rainfall or altitude. Nevertheless, we felt that soils largely govern timber growth just as they do the growth of other crops.

About 180 samples were taken from Douglas-fir stands ranging in age from 25 to 150 years. Most of the samples were from the 40- to 60-year bracket. In these 5- to 50-acre plots, we obtained the average height and average age of trees wherever a change in soils, slope or exposure occurred. We also examined the land on which the trees were growing and tabulated soil and other pertinent information.

Climatic factors, such as rainfall, temperature and altitude, were made constants by zoning areas having similar conditions. Woodland samples for lands of similar soils then were classified by site index values, averages determined, and statistical studies made. In this way, an average site index value was obtained for each utilitarian group into which the soils of the area were classified.

We know the functional role of soil in crop production is determined by moisture relationships, nutrient level and soil profile. Understanding of soil texture, profile and effective depth enables us to judge how much water a soil can hold and how available to trees it will be. The amount of water a Douglas-fir can obtain determines largely whether it will yield 150 or 850 board feet of lumber when it is 60 years old.

The new information gives to the farm planner a means of estimating the long-time timber-producing value of each acre. For field use, a set of forestry tables was adapted. The tables express the total costs per acre for raising Douglas-fir on the five recognized timber sites at any given age. They also express yields which can be harvested at various ages. Also they give the information needed for determining whether the best long-time use of a piece of land is timber, or pasture or cultivated crops.

Land-clearing programs can now be worked out logically. Farmers clearing land can use this information as a guide. For example, they may wish

(Continued on page 239)

LESPEDEZA CENTENNIAL

By Paul Tabor

DURING the past hundred years annual lespedeza has advanced from a harmless weed to an important crop. The first record of its occurence in this country is a small part of a plant sent to Harvard University from Monticello, Ga., in 1846. Annual lespedeza was found at other places in Georgia and South Carolina during the 1850's, but apparently was not widespread until the last years of the civil war.

In the summer of 1867, annual lespedeza was introduced to the public by the Augusta Agricultural Club. One writer reported in 1868, "Since its introduction, the newspapers have teemed with notices of its good qualities." Some appreciated its soil conserving possibilities. Comments from two South Carolina farmers in 1868—

"It renovates old land when turned under. It is admirable for preserving lands from washing."

"It grows on hill and valley; the bottoms of gullies are filled so densely that they can't wash any more."

The enthusiasm for annual lespedeza declined after 1868, possibly because of a combination of droughts in spring and summer, lowered phosphate supplies in the soils, and increased emphasis on cotton production through use of the newly introduced commercial fertilizers.

Annual lespedeza became a crop about 1880. Capt. J. B. McGehee of Laurel Hill, La., was a leader in its domestication. He founded the lespedeza seed industry. Its use as a crop increased slowly for the next 40 years.

The securing of better varieties for hill soils rapidly increased the acreage of annual lespedeza during the 1920's and early 30's. A tall, late common lespedeza, Tenn. 76, was selected at the Tennessee Experiment Station prior to 1919, and seed of both Kobe and Korean lespedezas were brought from eastern Asia in 1919. These new kinds were tested widely under the leadership of the late Dr. A. J. Pieters, of the United States Department of Agriculture.

A further stimulus for increased use of annual lespedeza came with the establishment of the Soil Conservation Service during the mid '30's. Now annual lespedeza is an important crop in the mid-south where it was discovered 100 years ago and almost domesticated 80 years ago. It is more important north of this area and is increasing in importance south of it. Experience has confirmed its value for soil conservation when used judiciously. If the first hundred years are the hardest, it should be even more valuable during the coming century.

NOTE.—The author is assistant chief, regional nursery division, Soil Conservation Service, Spartanburg, S. C.

GRASS PLANTING 2,660 YEARS AGO

By Philip F. Allan

NO one knows how far back man's efforts go in the establishment of good pastures. It is certain that pasturage has been an important land use since the first domestication of grazing animals—perhaps some 8,000 years ago. Agricultural historians may not have noted the following ancient record, which, by good fortune, may be accurately dated. It was customary for kings of old Assyria to recount their exploits to their gods somewhat in the manner of a letter. Thus, the king, Sargon, told the god, Assur, of the events of his eighth campaign. A part of this account[1] is quoted below:

> The city of Aniashtania, the home of his [Ursa's] herds, situated on the border of Sangibute, between the cities of Ushkaia and Tarmakisa, together with 17 cities of its neighborhood, I destroyed, I leveled to the ground; the large timbers of their roofs I set on fire, their crops [and] their stubble I burned, their filled-up granaries I opened and let my army devour the unmeasured grain. Like swarming locusts I turned the beasts of my camps into its meadows, and they tore up the vegetation on which it [the city] depended, they devastated its plain. . . . His pleasant fields, which were spread out [lit., lay] like a platter painted lapis lazuli [blue]—the surrounding plain planted to grass and *habburu*, with the chariots and horses of my destructive (?) advance, like Adad I overwhelmed and made the meadows, the support of his horses, like plowland.

Sargon's letter was inscribed in 714 B. C. The land he devastated was Armenia.

[1] From: *Ancient Records of Assyria and Babylonia.* Daniel D. Luckenbill. Vol. II. Univ. of Chicago Press. 504 pp. 1927.

NOTE.—The author is regional biologist, Soil Conservation Service, Fort Worth, Tex.

W. E. Rice lands on Perry's public square to conduct soil conservation panel.

Farmers On The Wing

By Clarence Paden

Manager, Chamber of Commerce, Perry, Okla.

OKLAHOMA, famous for its organization of Flying Farmers, may soon be transporting its soil conservation district supervisors to meetings by plane.

W. E. Rice, supervisor of the Noble County Soil Conservation District, was picked up at his farm by Pilot C. S. Vanderveer and flown to a recent district-sponsored meeting and landed—of all places—on one of Perry's streets on the public square. Rice was chairman of the occasion. On the trip also was Henry Machetta, engineering aide of the Soil Conservation Service.

Rice, former judge, practices what he preaches as far as soil conservation is concerned. He is introducing recommended soil-saving and soil-building measures on his farm near Red Rock.

"The impelling motive that brought me back to the farm is the land problem," he declared.

The occasion was Noble County's first big soil-conservation panel marking the close of the first year of actual operation of the county's soil conservation district. The day's program was sponsored by the district, assisted by the Perry Chamber of Commerce and various agricultural agencies. Response was gratifying, the session being forced to move from the district courtroom to a nearby theater to accommodate the 300 in attendance.

Participating were Leon J. McDonald, assistant State conservationist, Soil Conservation Service; Wesley Chaffin, extension agronomist, Oklahoma Agricultural and Mechanical College; Walter Marlin, secretary, State school land commission; Truman Cunningham, State office, Agricultural Adjustment Agency; Harry Elwell, assistant project supervisor, Red Plains Conservation Experiment Station, and others. Three cooperators told of their success with coordinated soil conservation programs. Four free airplane rides were awarded farmers in each section of the county to allow them to see their farms from the air. A display of farm equipment and machinery used in soil conservation attracted many. Charts were shown in the courthouse lobby.

Noble County farmers and businessmen in attendance voted to make the panel an annual affair. Ivan Dilley, work unit conservationist, reported that 75 farmers have signed as cooperators. It is interesting to note that approximately 85 percent of these cooperators already have established one or more soil conservation practices on their farms. Some of the cooperators even have completed the program with the exception of one or two minor measures.

Here they unload: Henry Machetta, Supervisor Rice, Pilot C. S. Vanderveer.

IMPROVING UTAH'S RANGE LANDS

By Victor A. Surface

Headquarters of the Benmore Land Utilization Project near Vernon, Utah. From here was directed the rehabilitation of 147,000 acres of worn-out land.

ONE-hundred forty-seven thousand acres of worn-out, depleted range land in central Utah have been rehabilitated and put into profitable use since 1940. The story of this recovery, and the methods used to bring it about, could well serve as a guide to range land owners all over the West. It shows how similar lands can be returned to the production of the flourishing grasses that delighted early settlers.

The Central Utah Land Utilization Project, started by the Resettlement Administration during the middle 30's and administered since 1940 by the Soil Conservation Service, was designed to return depleted range and submarginal crop lands to profitable use and to demonstrate to Utah ranchers methods of keeping such lands in top producing condition. Today the project yields more feed per acre than any of the lands adjoining. Local ranchers who graze their cattle on the area have some startling facts to tell about the results achieved.

In the early 30's Congress authorized the purchase of lands throughout the United States where it was imperative that serious erosion and water wastage be checked. In many instances it was evident that continued use under the existing system of agriculture would result in ultimate disaster. In Tooele and Juab Counties, private landowners homesteaded vast areas to develop dry land farms, but climatic conditions prevented successful operations. Consequently, much of this land was abandoned and a large percentage of it reverted to the counties for delinquent taxes.

When conservation activities were initiated by the government the native vegetation had been badly depleted through over-grazing and the remaining plants were not able to protect the land from wind and water erosion.

First step taken by the government was to control grazing on the project to give the vegetation an opportunity to regain its vigor. Under agreement with the Soil Conservation Service, grazing permits to implement this policy were issued by the U. S. Grazing Service.

But badly misused land can't recover its former health without considerable encouragement. It was necessary to reseed on a large scale. Hundreds of acres were planted by means of various methods. Some were plowed, and then planted in the fall after the seedbed had settled. Some were planted on the contour with a lister-seeder which

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NOTE.—The author is head of the education section, Soil Conservation Service, Albuquerque, N. Mex., and was formerly District Conservationist at Tooele, Utah.

left furrows to hold the rainfall. Some were drilled directly into the Russian thistle.

Three thousand two hundred acres of land several miles south of the Vernon community in southern Tooele County had been set aside for experimental purposes. This area is known as the Benmore pastures, the name being a combination of the names of two early settlers, the Bennions and the Skidmores. In the old dry-farming days a town had thrived there.

The Benmore area was fenced into 28 100-acre experimental grazing pastures, one 240-acre holding pasture, and one 160-acre unit of test reseeding plots where the Intermountain Forest and Range Experiment Station of the U. S. Forest Service, the Bureau of Plant Industry, and the Utah Agricultural Experiment Station carry on tests of different varieties and species of range forage plants, depths, methods, and times of seeding range forage plants, in cooperation with the Soil Conservation Service.

On the experimental grazing pastures a mixture containing crested, western, and slender wheatgrasses, smooth bromegrass, tall meadow oatgrass, and bulbous bluegrass was planted. The seedbeds had been prepared by disc plowing. Half the pastures were originally seeded in 1938 and the remainder in 1939.

Surprisingly, the crested wheatgrass was the only species which made an impressive growth. A native of the steppes of Siberia, this grass made a vigorous stand at Benmore. Each of the other grasses grew to a small extent, but all of them were dwarfed by the crested wheatgrass.

It was necessary to give these reseeded areas protection from grazing until the fall of 1941. By that time crested wheatgrass had crowded out most of the invading cheatgrass and Russian thistle in 12 of the pastures. Cattle were allowed to graze a total of 542 cow-months in the fall of 1941. The following fall, 636 cow-months of grazing were permitted and 173 acres were harvested for seed.

By the fall of 1943, all of the pastures could be grazed. In addition to 258 cow-months of summer grazing, 1,522 cow-months of fall grazing were allowed in 1943. Also, 16,000 pounds of seed were obtained from 231 acres of the pasture areas.

For two months in the spring of 1944, 225 cattle grazed the pastures. Cows without calves showed an average gain of 2.33 pounds per day. Cows with nursing calves gained 1.33 pounds a day, and their calves gained 1.75 pounds per day. Cows which calved in the pastures after they had been weighed in, gained 0.75 pound per day and their calves gained 2 pounds per day. The average daily gain of all classes of cows grazing outside the project on depleted native range land was approximately 1.3 pounds.

Four cows and calves owned by Sidney Pehrson made average daily gains of 2 pounds per head. Four dry cows owned by Alma Nieldsen made gains of 3 pounds, 3.1, 3.4, and 3.7, respectively. Heifers owned by D. J. Frederickson and Ed Anderson made similar gains .

Results like these have caused a considerable change on the land that surrounds the land utilization project. Ranchers who benefited by the reseeding operations have decided to apply the same practices on their own lands. Special equipment has been developed for an extensive reseeding program on private lands, and all the lessons learned by the Soil Conservation Service in preparing the land for reseeding are being used by the Vernon Soil Conservation District ranchers in improving their lands.

For example, it became apparent that considerable attention should be paid to the preparation of a seedbed. Plants such as sagebrush or cheatgrass offer considerable competition to the young grass seedlings and frequently need to be elimi-

Crested wheatgrass grows knee high. One acre carries as many cattle as 7 acres of sagebrush. Interested here in the results of range reseeding are Gerald Geraldson, H. K. Woodward, J. A. Libby and H. D. Kronk.

This one-way disc plow is removing sagebrush on lands near Vernon, Utah. Crested wheatgrass will take its place, increasing the grazing capacity of the range.

nated before plantings are made. This enables covering the seed to the right depth and gives the seedlings a chance to establish themselves against plants which naturally compete with the perennial grass for moisture. The ranchers also learned the importance of other range management practices such as deferred and rotation grazing, proper stock water distribution and salting. They are also raising the quality of their beef cattle through improved sires and careful culling of cows. They are regulating cattle breeding so as to market more uniform calves.

The production of grass seed proved to be an important by-product of the reseeding operations. Yields ranging from 85 to 300 pounds per acre have been obtained. During 1944, approximately 17,000 pounds of crested wheatgrass seed was harvested on a small portion of the experimental area. This fall almost 2,000 pounds of grass seed were produced from the pastures, notwithstanding the increased grazing load carried during the spring months of 1945.

Last spring the grazing load on the experimental area was raised to 425 cattle. These cattle were taken from an overgrazed area outside the project and were not put on the National Forest lands until July 5, a full six weeks after they are customarily allowed on the forest. Examinations made of the summer range last June show that native plants are regaining their vigor as a result of the relief afforded by the crested wheatgrass.

These factors in the success of the land utilization project are immediately apparent, but its ultimate effect on the livestock economy of the state will be further enhanced as continued safe land use practices, demonstrated on this once useless area, are applied by keepers of the surrounding lands—men who will doubtless observe the benefits, increased profits, and security involved in the application and improvement of the same conservation practices.

Should This Land Be in Timber?

(Continued from page 234)

to leave their site I land that is producing timber at a high rate to the last of their clearing, or they may wish to keep it in timber. Site III or IV land may produce the highest grass or grain yields. From the tables, clearing costs also may be estimated. The soils-timber site data in Lewis County provides a usable guide for selecting favorable tree-planting sites.

Some soils, excellent for Douglas-fir, are relatively poor for cultivated crops, because Douglas-fir growth needs are different from those of cereals or grass.

Correlations between timber site classes and soils groups could be worked out for other timber types and for other areas; all that's needed is a reliable set of site index values for the species concerned. Once the correlation has been obtained, the district conservation survey, prepared on a utilitarian basis, can be used as an accurate expression of timber productivity and as an added tool in land-use planning. Land capability classes complete the picture by highlighting the management requirements consistent with soil and water conservation needs and best long-time use.

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